*[Continued on next page]*

(54) Title: METHOD AND SYSTEM FOR HANDLING A NETWORK-IDENTIFIED EMERGENCY SESSION
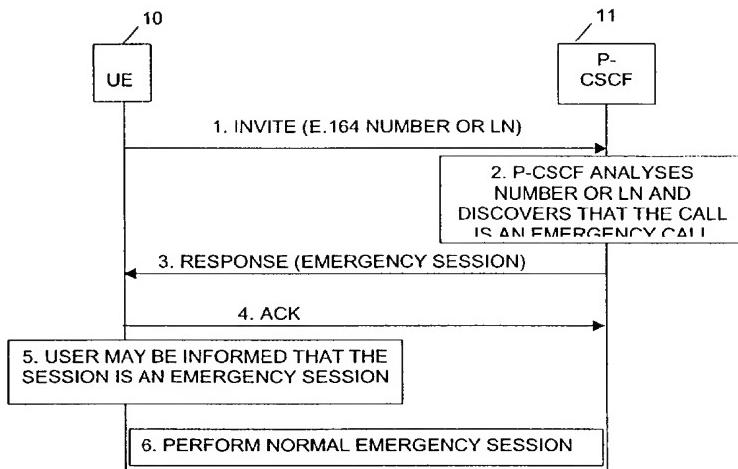
(57) Abstract: The invention relates to a method and system for establishing an emergency session in a communication system which includes at least one user equipment and one or more network entities involved in establishing an emergency session. When the user equipment initiates a session by sending a message to a network entity indicating an identifier, e.g. the call number or logical name of a called entity, one of said network entities analyses the received identifier. When detecting that the session to be initiated is an emergency session, an information is returned to the user equipment for informing the latter that the initiated session is an emergency session. The user equipment thereupon initiates the execution of an emergency session. Thus, even when the user equipment is unable to detect, by itself, that the intended session is an emergency session, the network will inform the user equipment on the emergency session for ensuring appropriate handling thereof.

## TITLE

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## METHOD AND SYSTEM FOR HANDLING A
## NETWORK-IDENTIFIED EMERGENCY SESSION

10                    **FIELD AND BACKGROUND OF THE INVENTION**

The invention generally relates to the connection of
emergency sessions such as emergency calls.

15    Emergency calls shall be supported in IP Multimedia networks
(IMS). The UE (User Equipment) may usually be able to
indicate in the initial session setup (e.g. in the INVITE
message of SIP) that the session is an emergency session.

20    However, there may be situations where the initial session
setup message is just sent with an ordinary number and there
is no indication about the emergency. These situations may
e.g. occur when a subscriber is roaming in another IMS
network.

25
It is important to identify the intended emergency session as
soon as possible, because the network and the UE need to
perform some special actions for performing the emergency
session.

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## SUMMARY OF THE INVENTION

The present invention provides method and system for enabling
35    emergency sessions to be established in a reliable manner.

The invention provides a method and/or system as defined in the claims.

5    This invention discloses means and functions of how the network can detect an emergency session, how the UE can be informed about it and what effects this information has on later session setup.

10   The invention provides among others a Network-identification of an emergency session initiated by a session initiating entity such as a user equipment (UE) including mobile or stationary stations or terminals, or the like.

15   Even when the user equipment is unable to detect by itself that the initiated session is an emergency session, it is quickly informed thereon and can then initiate the appropriate steps for establishing the emergency session.

20   According to a first embodiment of the invention, in order to guarantee resources at the transport level for the emergency call, a response is sent back to the UE immediately after a control means such as P-CSCF has discovered that the session is an emergency session. When the UE receives such a response
25   it will perform a normal emergency session procedure, e.g. as defined in 3GPP specifications. To execute a normal emergency session, the UE will e.g. obtain or query location information and send it in the INVITE message and also the UE will activate an emergency PDP context for the session.

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The invention enables to identify the session to be an emergency session as soon as possible so that the network and the UE can perform the necessary special actions for the emergency session as quickly as possible.

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In one of the alternative implementations of the invention, the control entity such as P-CSCF does not respond immediately to UE when it has received an INVITE message from the UE but waits for the reception of a message, e.g. 183

5   Session Progress, from an emergency center or an intermediate network entity, and adds to that message the emergency information.

The information about the emergency call is not delayed at

10  all, and the call establishment is continued in the conventional or any other manner such as with the 183 Session Progress message.

Sending an INVITE message takes remarkable radio resources

15  and it is not preferable to send multiple INVITE messages. Actually there is no delay in session establishment, since UE has not yet started creating secondary PDP Context before UE receives the SDP message. This means that the indication can be included with high priority for the user plane. If no

20  emergency centre is indicated, a default emergency center may be chosen.

This invention concerns a situation, in which PDP context activation can not or will not be performed at first when

25  initiating a session for any reason, but a message such as an INVITE message is sent first from the UE to the CSCF.

Further details, aspects and advantages of the invention will become apparent from the following reference to specific

30  embodiments and the attached drawings.


**BRIEF DESCRIPTION OF THE DRAWINGS**

35  Fig. 1 shows a first embodiment of a method and system in

accordance with the present invention;

Fig. 2 shows a second embodiment of a method and system in accordance with the present invention;

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Fig. 3 illustrates a third embodiment of a method and system in accordance with the present invention;

Fig. 4 shows an implementation for emergency session
10   processing in a normal case.

## DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

15   This invention discloses solutions to several problems such
as:
- The UE is able to activate an emergency PDP context after
it has been informed about the session characteristics. This
is important to get high priority for the PDP context in the
20   GPRS (General Packet Radio Service) and RAN (Radio Access
Network).

- The UE sends location information after it is being
informed about the session characteristics (it is assumed
25   that location information is not sent in every INVITE
message). The location information is used for selecting the
most suitable Emergency Centre (EC).

Fig. 1 shows an embodiment of the invention which includes a
30   call originating element, i.e. a session initiating element,
such as a mobile station (UE) 10, and a network which
comprises a serving network element such as a Serving GPRS
Support Node (SGSN), and a further control element such as a
Call State Control Function (CSCF) or Proxy Call State
35   Control Function (P-CSCF) 11. The further network elements

necessary for completing an IP multimedia session such as a
terminating element, a gateway node if needed, a subscriber
information register such as a home location register (HLR)
or home subscriber server (HSS), etc. are known to the

5    skilled man and are therefore neither shown nor described in
more detail. Generally, a MSC (Mobile Switching Centre, not
shown) may return to UE a Call Proceedings message which
contains a Priority information field defining also EC
(Emergency Centre).

10

In all embodiments described above or below, the UE 1 may be
equipped with a USIM (User Services Identity Module).

The embodiments shown in Figs. 1, 2, and 3 relate to a

15   Network-identified emergency session.

A solution to guarantee resources at the transport level to
perform the emergency call is to respond back to the UE 10
immediately after a network entity, e.g. a control means such

20   as P-CSCF 11, has discovered that the session is an emergency
session. When the UE 10 receives the response, i.e. is
informed, by the network, on the initiated session being an
emergency session, it will perform normal emergency session
procedure, e.g. as defined in 3GPP specifications.

25

Fig. 1 shows the solution at a general level.

In step 1, the UE 10 sends a session initiation message,
e.g. an INVITE message of SIP (Session Initiation Protocol),

30   which indicatess an identifier, e.g. the E.164 number or LN
(logical name), of the called entity, to the P-CSCF 11.
In a step 2, the P-CSCF 11 analyses the number or LN.
When detecting that a normal session is to initiated, a
normal connection procedure is continued. When, however, the

35   P-CSCF 11 discovers that the call is emergency call, steps 3

to 6 shown in Fig. 1 are performed.

In step 3, a response is sent to the UE 10 indicating that the session is an emergency session.

Step 4: The UE 10 returns an acknowledgement message ACK to the P-CSCF 11.

In an optional step 5, the UE 10 may inform the user that the session is emergency session, e.g. by displaying an appropriate message on a display of the UE 10.

Then, a normal emergency session is executed (performed) as indicated by step 6. The execution of a normal emergency session means that the UE 10 will e.g. obtain location information and send it in the INVITE message and also that the UE 10 will activate an emergency PDP context for the session.

The response message at step 3 can be a new message, or an existing SIP message or other known message can be used. The information in the response message may be a new parameter in SIP protocol, but an existing parameter may also be used.

Fig. 2 shows a solution in which, in step 3, a SIP 302 message "Moved Temporarily" is used as response. The parameter value in the 302 message indicates that the session is an emergency session. The parameter may e.g. be "Contact: sip:emergency@visited.cscf.com". This value can e.g. be used in SIP URI when sending a new INVITE message to P-CSCF 11, or the UE 10 just generates a new INVITE message with the indication of an emergency session. Another alternative can be to use the SIP NOTIFY method.

Apart from the above discusion, the embodiment shown in Fig. 2 has the same structure and functioning as the one of Fig. 1.

Fig. 3 illustrates another embodiment of the invention. In

addition to the UE 10 and the P-CSCF 11, a Serving CSCF (S-CSCF) 12 and an Emergency Centre (EC) 13 are shown. The embodiment according to Fig. 3 provides an alternative functioning as compared to the embodiments of Figs. 1 and 2.

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In order to achieve a very fast session establishment the P-CSCF 11 does not respond back to the UE 10 immediately after P-CSCF 11 has discovered that the session is an emergency session. On the contrary it continues session establishment

10   and optionally, if possible, the P-CSCF 11 adds an indication of emergency session to the messages generated by P-CSCF 11 for ensuring high priority treatment of the messages.

The details of the procedure are shown in Fig. 3. Taking

15   account of the nature of emergency session it is highly desirable not to add any additional delay also in case of abnormal situations to session establishment. By using the alternative of Fig. 3, it is possible to avoid the transfer of another INVITE message over the air interface, which is

20   probably the largest and slowest message and thus very time-consuming.

The response message (in SIP, preferably a message "183 Progress") to the UE 10 preferably includes an indication of

25   emergency session. This allows to activate an emergency PDP context for the session.

If there should not exist location information in S-CSCF 12 (or the relevant server) to select an emergency center 13,

30   the S-CSCF 12 (or relevant server) will select an emergency center 13 without location information of the user (e.g. it selects a default emergency center, nearest emergency center or it may use some other technique to select the emergency center e.g. based on the address of P-CSCF 11.

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As shown in Fig. 3, in step 1, the UE 10 initiates a session establishment and sends a session setup message, e.g. an INVITE message, to the P-CSCF 11. The P-CSCF 11 analyses the number or logical name (LN) of the called party/entity

5    indicated in the session setup message, and discovers that the call is an emergency call. The P-CSCF 11 may add an indication of emergency session to the INVITE message (it is also possible that other elements add this indication of emergency session to the INVITE message).

10

In step 2, the INVITE message is forwarded to the S-CSCF 12.

In Step 3, the S-CSCF 12 selects an emergency center

15   (EC) 13 and forwards the INVITE message to the EC 13.

Step 4: The EC 13 responds to the INVITE request by returning a response such as SIP 183 "Session Progress" to the S-CSCF 12. The subset of the media flows shown in steps 4

20   to 6 indicates that messages are returned back to originating endpoints proposing an EC 13 for providing support, or requesting the emergency session.

Step 5: The S-CSCF 12 forwards the response such as SIP

25   183 "Session Progress" back to the P-CSCF 11.

Step 6: The P-CSCF 11 forwards the response such as SIP 183 "Session Progress" back to the UE 10. The response includes the indication of emergency session. The UE 10 thus

30   learns that this session is an emergency session and can act properly.

The circles and ovals shown in Fig. 3 mean "Emergency call detected, Possibility to add an emergency indication".

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Fig. 4 presents a proposal for normal emergency session
establishment for the case where the UE has USIM. It is
assumed that the UE has activated a signalling PDP context to
the GGSN in the visited PLMN.

In the following, the steps shown in Fig. 4 are described in
more detail, referring to the step numbering of Fig. 4.

1. UE may request SAI (Service Area Identity) from SGSN.

2. SGSN sends response message to UE.

3. UE sends the SIP INVITE request, containing an initial
   SDP, to a P-CSCF determined via the CSCF discovery
   mechanism. Information about emergency call is sent in the
   INVITE message. UE includes the location information in
   the INVITE message.

4. P-CSCF detects that the call is an emergency call using
   the information in the INVITE message e.g. by analysing
   the number or name requested. P-CSCF selects a S-CSCF in
   the visited network and forwards the SIP INVITE request
   including the information about emergency call to S-CSCF.

5. S-CSCF uses the location information to select an
   appropriate EC. S-CSCF forwards the request to EC.

6.  The media stream capabilities of the destination are
   returned along the signaling path.

7.  S-CSCF forwards the message containing the destination
   SDP cababilities to P-CSCF.

8. P-CSCF authorizes the resources necessary for this
   session.

9. P-CSCF forwards the SDP message to the originating
   endpoint.

10.  UE decides the final set of media streams for this

session, and sends the Final SDP to P-CSCF.

11.   P-CSCF forwards the final SDP to S-CSCF.

12.   S-CSCF forwards this message to EC.

13.     Activate PDP Context Request. The UE activates a PDP
context for the emergency session by sending the Activate
Secondary PDP Context Request message to the SGSN. The UE
indicates that the PDP context is used for an emergency
session. For the PDP context, the Allocation / Retention
Priority shall be at once set to the high value.

14.   The SGSN, when recognising that the PDP context is for
an emergency session, may itself request location
information from SRNC, in order to receive updated or more
accurate location information regarding the UE. SGSN
thereafter sends a location report to Gateway Mobile
Location services Centre (GMLC) as specified in TS 23.271,
and the EC may obtain this location information from GMLC.

15.   Radio Access Bearer Setup

16.   Create PDP Context Request

17.   Create PDP Context Response

18.   Activate PDP Context Accept

19.   UE sends the "Resource Reservation Successful" message
to the terminating endpoint, via the signaling path
established by the INVITE message.

20.   P-CSCF forwards this message to S-CSCF.

21.   S-CSCF forwards this message to EC.

22.   Resources are reserved successfully.

23.   EC sends information about alerting to S-CSCF.

24.   S-CSCF forwards the Ringing message to P-CSCF.

25.    P-CSCF forwards this message to UE.

26.    EC answers the call and sends final 200 OK message to S-
       CSCF.

27.    S-CSCF forwards final 200 OK message to P-CSCF.

28.    P-CSCF indicates the resources reserved for this session
       should now be committed.

29.    P-CSCF forwards final 200 OK message to UE.

30.    UE starts the media flow for this session.

31.    The calling party responds to the 200-OK final response
       with a SIP ACK message which is sent to P-CSCF.

32.    P-CSCF forwards the SIP ACK message to S-CSCF

33.    S-CSCF forwards the ACK message to EC.


Although the invention has been described above with
reference to specific embodiments, the scope of protection of
the invention intends to cover all modifications, omissions,
additions and amendments of the disclosed features as well.

The teaching according to the invention is preferably
implemented in an All-IP Network but may also be employed in
networks of various other types, i.e. in IM, GPRS and UMTS
domains.

## CLAIMS

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1. A method for establishing an emergency session in a
communication system which includes at least one user
equipment and one or more network entities involved in
establishing an emergency session, wherein, when said user
10   equipment initiates a session by sending a message to a
network entity indicating an identifier of a called entity,
one of said network entities analyses the received
identifier, and, when detecting that the session to be
initiated is an emergency session, an information is sent to
15   the user equipment for informing the user equipment that the
initiated session is an emergency session.-

2. A method of claim 1 comprising a further step wherein
the user equipment initiates the execution of an emergency
20   session upon receipt of said information sent to the user
equipment for informing the user equipment that the initiated
session is an emergency session.

3. Method according to claim 2, wherein the execution of
25   the emergency session includes the step of obtaining location
information of the user equipment and of sending the location
information to one of the network entities.

4. Method according to claim 2 or 3, wherein the
30   execution of the emergency session includes the step of
activating an emergency PDP context for the session.

5. Method according to any one of the preceding claims,
35   wherein the information returned to the user equipment is a

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message, preferably a SIP (Session Initiation Protocol)
message, which includes a parameter indicating an address of
a network entity to be addressed for establishing an
emergency session.

6. Method according to any one of the preceding claims,
wherein the identifier of the called entity is the call
number or logical name of the called entity.

7. Method according to any one of the preceding claims,
wherein, when the network entity detects that the session to
be initiated is an emergency session, an emergency center is
informed on the emergency session to be established, and said
information is returned to the user equipment only after
receipt of a response from the emergency center, the
emergency session then being established between the user
equipment and the emergency center.

8. Method according to any one of the preceding claims,
wherein the network entity analysing the received identifier
is a Call State Control Function (CSCF).

9. A method for establishing an emergency session in a
communication system which includes at least one user
equipment and at least one call controlling network element
involved in establishing an emergency session, wherein, when
said user equipment initiates a session by sending a message
to the call controlling network element indicating an
identifier of a called entity, the call controlling network
element analyses the received identifier, and, when detecting
that the session to be initiated is an emergency session, an
information is returned to the user equipment for informing
the user equipment that the initiated session is an emergency
session.

10. A method of claim 9, wherein the call controlling network element is a P-CSCF.

11. A method of claim 9 or 10, comprising a further step wherein the user equipment reinitiates the session by sending a message to the call controlling network element, the message comprising the said information.

12. A Method of claim 9 or 10, comprising a further step wherein the user equipment initiates a new session by sending a message to the call controlling network element the message comprising the said information.

13. A method of claims 11 or 12, comprising the further step of, in response to receiving the information, the network initiating the execution of the emergency session.

14. A method for establishing an emergency session in a communication system which includes at least one user equipment, at least one call controlling network element involved in establishing an emergency session, and an emergency center, wherein, when said user equipment initiates a session by sending a message to the call controlling network element indicating an identifier of a called entity, the call controlling network element analyses the received identifier, and, when detecting that the session to be initiated is an emergency session, the network element sends an information to the emergency center or to an intermediate network element for forwarding the information to the emergency center, said information informing the emergency center on the emergency session to be established, an indication of the emergency session being sent to the user equipment for informing the user equipment that the initiated session is an emergency session.

15. Method according to claim 14, wherein after receipt
of a response from the emergency center, the emergency
session is established between the user equipment and the
emergency center.

16. A method of claim 14 or 15, wherein the call
controlling network element is a P-CSCF.

17. A communication system for establishing an emergency
session, the communication system including at least one user
equipment and one or more network entities involved in
establishing an emergency session, wherein
        said user equipment is adapted to initiate a session by
sending a message to a network entity indicating an
identifier of a called entity,
        one of said network entities is adapted to analyse the
received identifier,
        when detecting that the session to be initiated is an
emergency session, said analysing network entity or another
network entity is adapted to send an information to the user
equipment for informing the latter that the initiated session
is an emergency session.

18. A system according to claim 17, wherein the user
equipment is adapted to initiate, when receiving the
information that the initiated session is an emergency
session, the execution of an emergency session.

19. System according to claim 18, wherein the execution
of the emergency session includes the step of obtaining
location information of the user equipment and of sending the
location information to one of the network entities.

20. System according to claim 18 or 19, wherein the

execution of the emergency session includes the step of
activating an emergency PDP context for the session.

5    21. System according to any one of the preceding system
claims, wherein the information returned to the user
equipment is a message, preferably a SIP (Session Initiation
Protocol) message, which includes a parameter indicating an
address of a network entity to be addressed for establishing
an emergency session.
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22. System according to any one of the preceding system
claims, wherein the identifier of the called entity is the
call number or logical name of the called entity.

15    23. System according to any one of the preceding system
claims, wherein the network entity, when detecting that the
session to be initiated is an emergency session, is adapted
to inform an emergency center on the emergency session to be
established, and to send said information to the user
20    equipment only after receipt of a response from the emergency
center, the emergency session then being established between
the user equipment and the emergency center.

24. System according to any one of the preceding system
25    claims, wherein the network entity analysing the received
identifier is a Call State Control Function (CSCF).

25. A communication system for establishing an emergency
session, the communication system including at least one user
30    equipment and at least one call controlling network element
involved in establishing an emergency session, wherein, when
said user equipment initiates a session by sending a message
to the call controlling network element indicating an
identifier of a called entity, the call controlling network
35    element is adapted to analyse the received identifier,

wherein, when detecting that the session to be initiated is an emergency session, to send an information to the user equipment for informing the user equipment that the initiated session is an emergency session.

26. A system of claim 25, wherein the call controlling network element is a P-CSCF.

27. A system of claim 25 or 26, wherein the user equipment is adapted to reinitiate the session by sending a message to the call controlling network element, the message comprising the said information.

28. A system of claim 25 or 26, wherein the user equipment is adapted to initiate a new session by sending a message to the call controlling network element, the message comprising the said information.

29. A system of claims 25 or 26, wherein the network is adapted to initiate the execution of the emergency session in response to receiving the information.

30. A communication system for establishing an emergency session, the communication system including at least one user equipment, at least one call controlling network element involved in establishing an emergency session, and an emergency center, wherein, when said user equipment initiates a session by sending a message to the call controlling network element indicating an identifier of a called entity, the call controlling network element is adapted to analyse the received identifier, and, when detecting that the session to be initiated is an emergency session, to send an information to the emergency center or to an intermediate network element for forwarding the information to the emergency center, said information informing the emergency

center on the emergency session to be established, an
indication of the emergency session being sent to the user
equipment for informing the user equipment that the initiated
session is an emergency session.

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    31. A system according to claim 30, wherein after
receipt of a response from the emergency center, the
emergency session is established between the user equipment
and the emergency center.

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    32. A system of claim 31 or 32, wherein the call
controlling network element is a P-CSCF.

**FIG. 1**

1. INVITE TO: 999

2. P-CSCF ANALYSES
NUMBER OR LN AND
DISCOVERS THAT THE CALL
IS AN EMERGENCY CALL

3. 302 MOVED TEMPORARILY
(Contact: **sip**:emergency@visited.cscf.com, to: 999)

4. ACK

5. USER MAY BE INFORMED THAT THE
SESSION IS AN EMERGENCY SESSION

6. PERFORM NORMAL EMERGENCY SESSION

10

11

UE

P-
CSCF
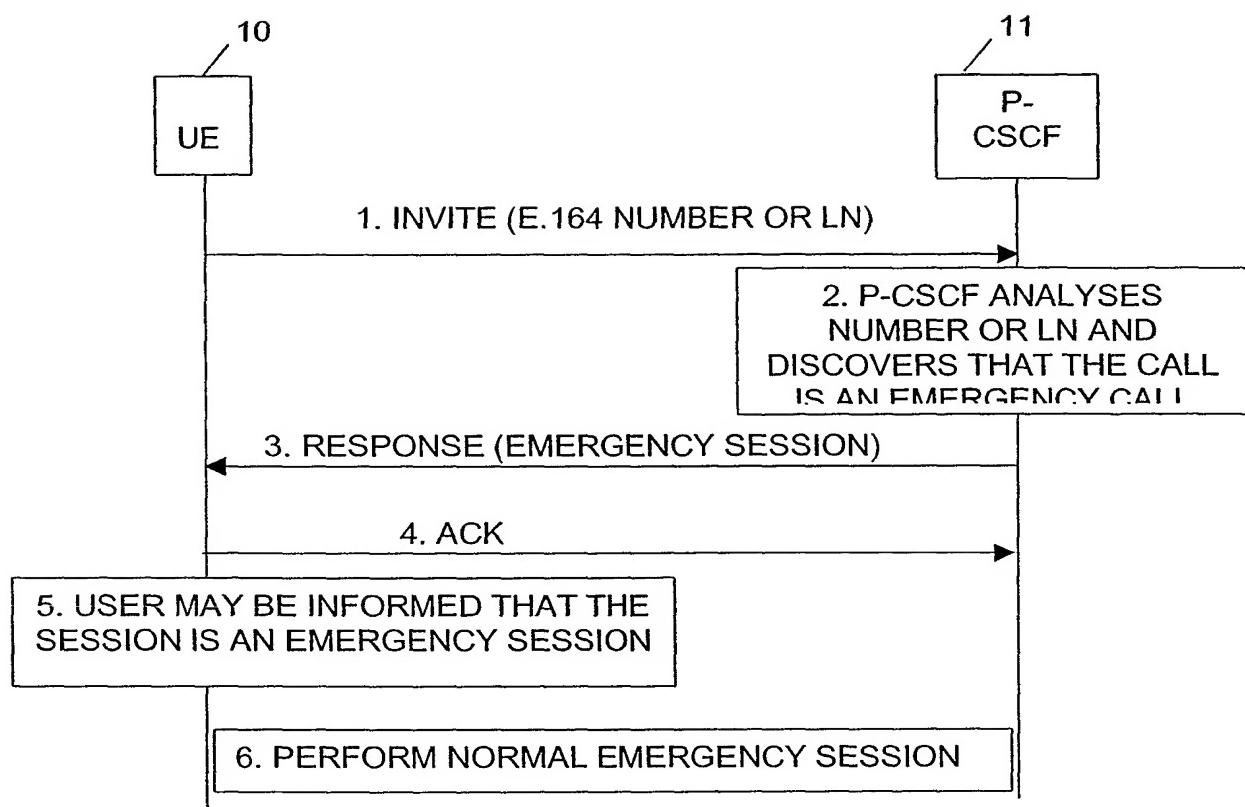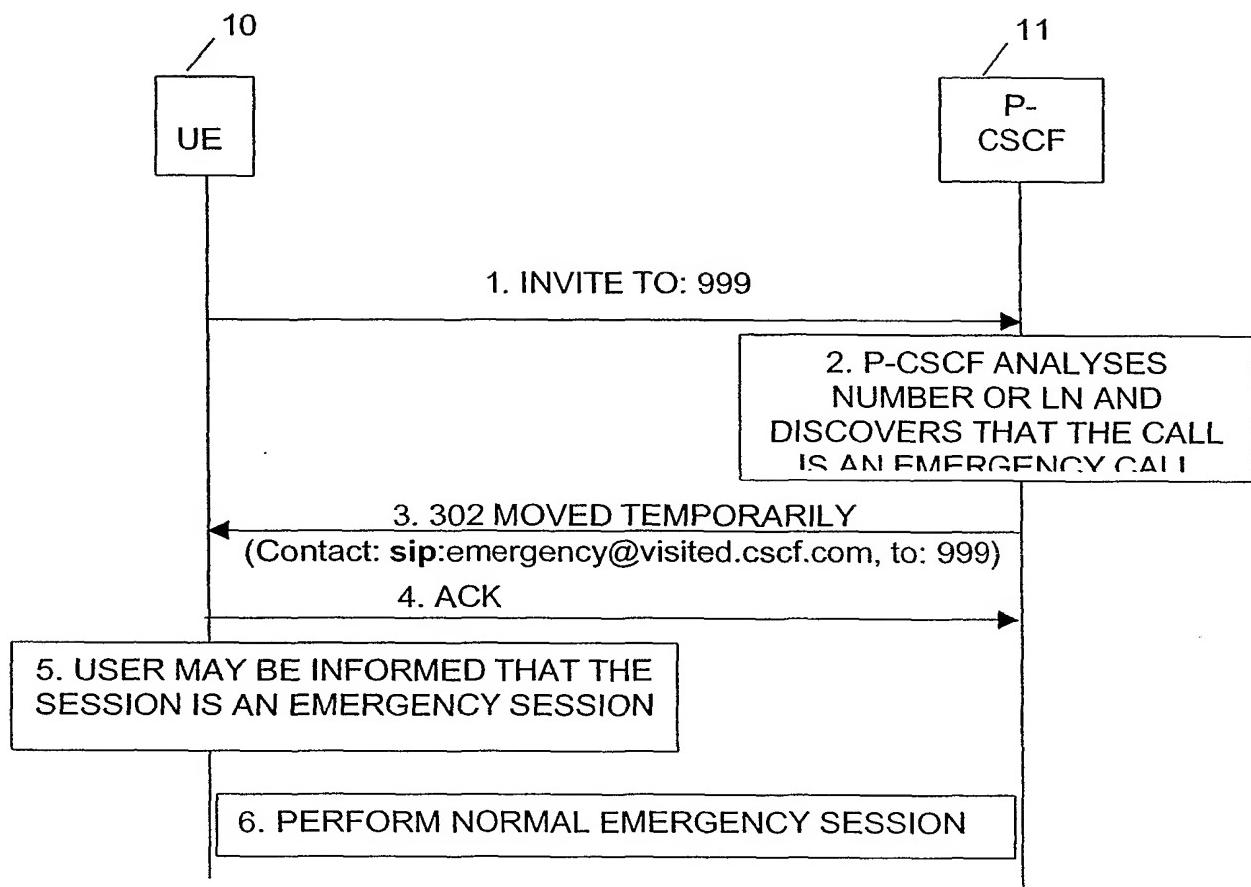
# FIG. 2
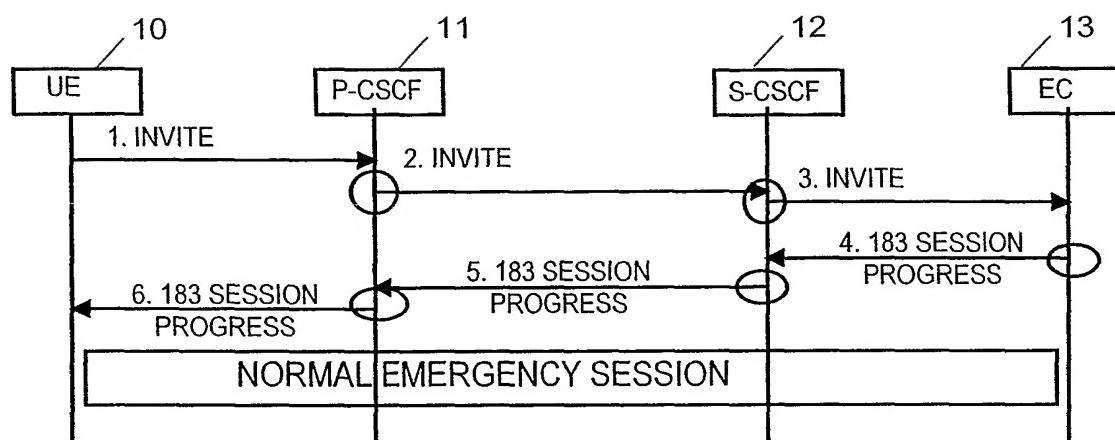
EMERGENCY CALL DETECTED, POSSIBILITY TO ADD INDICATION

# FIG. 3
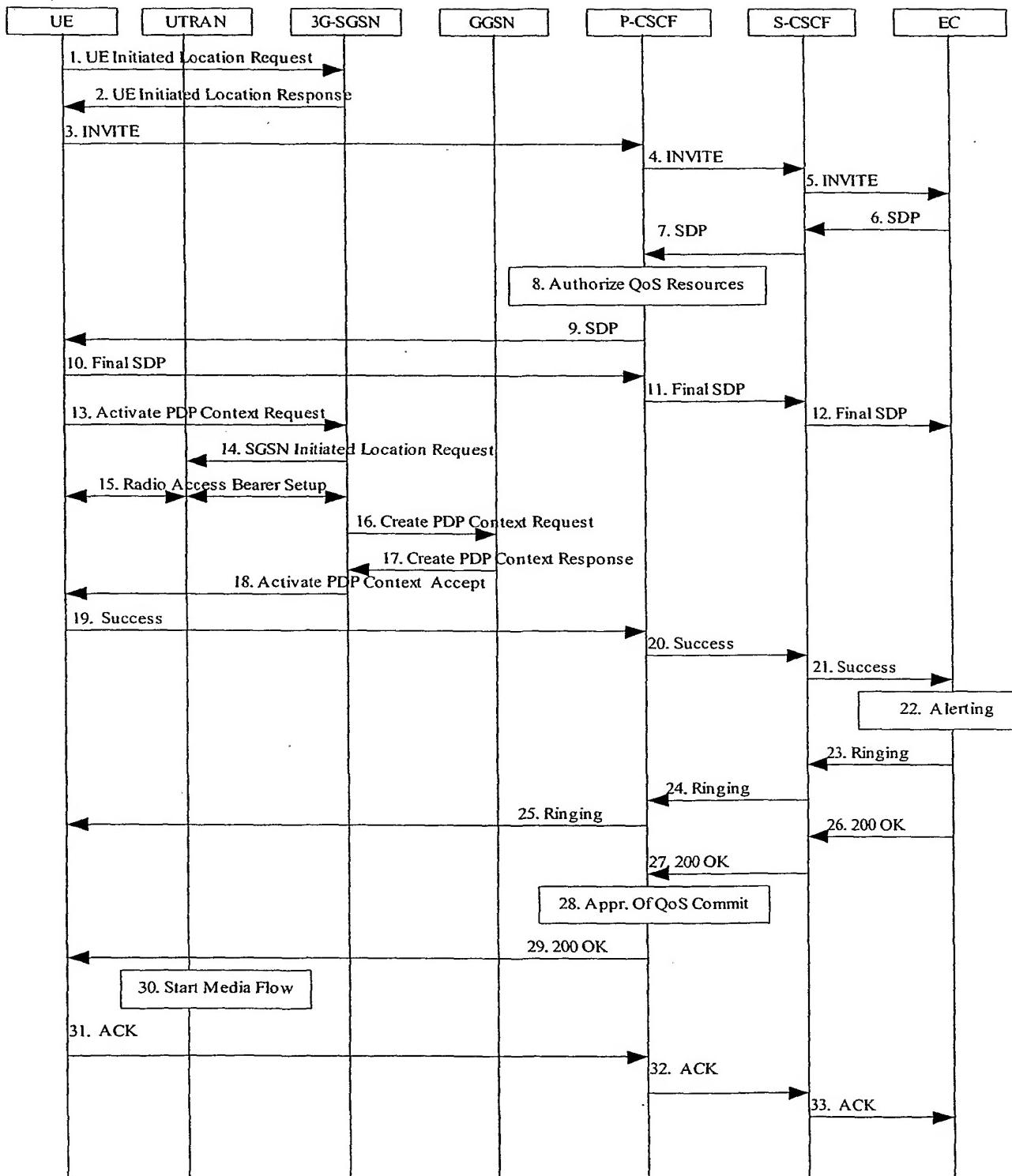
**FIG. 4**

# INTERNATIONAL SEARCH REPORT

## A. CLASSIFICATION OF SUBJECT MATTER
IPC 7   H04Q7/38      H04Q3/00      H04L29/06

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7   H04Q   H04M   H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, INSPEC

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | WO 92 16077 A (MOTOROLA INC) 17 September 1992 (1992-09-17) page 5, line 7-35 | 1,9,14, 17,25,30 |
| A | US 5 689 548 A (ALPEROVICH VLADIMIR  ET AL) 18 November 1997 (1997-11-18) column 4, line 8 -column 6, line 49 | 1,9,14, 17,25,30 |
| A | MOH M ET AL:  "Mobile IP telephony: mobility support of SIP" PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON COMPUTER COMMUNICATIONS AND NETWORKS, XX, XX, 11 October 1999 (1999-10-11), pages 554-559, XP002143545 the whole document | 1,9,14, 17,25,30 |

-/--

| X | Further documents are listed in the continuation of box C. | | X | Patent family members are listed in annex. |

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 6 December 2001 | 12/12/2001 |

| Name and mailing address of the ISA | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016 | Roberti, V |

Form PCT/ISA/210 (second sheet) (July 1992)

| C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT | | |
|---|---|---|
| Category ° | Citation of document, with indication,where appropriate, of the relevant passages | Relevant to claim No. |
| A | DE 196 38 112 A (SIEMENS AG)<br>23 April 1998 (1998-04-23)<br>the whole document<br>--- | 1,9,14,<br>17,25,30 |
| A | WO 99 21380 A (ERICSSON TELEFON AB L M)<br>29 April 1999 (1999-04-29)<br>the whole document<br>----- | 1,9,14,<br>17,25,30 |

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

# INTERNATIONAL SEARCH REPORT

Information on patent family members

| Patent document cited in search report | | Publication date | Patent family member(s) | | Publication date |
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